

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 3005-1 (1979): Grey Cast Iron Ingot Moulds, Stools and Slag Ladles, Part I: Bottom Stools for Large Size Ingot Moulds Weighing 8 Tonnes and Higher [MTD 6: Pig iron and Cast Iron]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



IS : 3005 (Part I) - 1979

(Reaffirmed 2002)

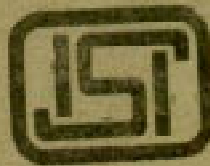
Indian Standard

**SPECIFICATION FOR GREY CAST IRON
INGOT MOULDS, STOOLS AND SLAG LADLES**

**PART I BOTTOM STOOLS FOR LARGE SIZE INGOT
MOULDS WEIGHING 8 TONNES AND HIGHER**

(First Revision)

UDC 621.746.393.077.183.2 : 669.131.6



© Copyright 1980

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Price Rs 5.00

Gr 2

April 1980

*Indian Standard*SPECIFICATION FOR GREY CAST IRON
INGOT MOULDS, STOOLS AND SLAG LADLES**PART I BOTTOM STOOLS FOR LARGE SIZE INGOT
MOULDS WEIGHING 8 TONNES AND HIGHER***(First Revision)*

Cast Iron and Malleable Cast Iron Sectional Committee, SMDC 9

Chairman

DR PRANLAL PATEL

*Representing*Malleable Iron & Steel Castings Co Pvt Ltd,
Bombay*Members*

SHRI R. M. BALANI

Directorate General of Technical Development,
New DelhiSHRI T. R. MOHAN RAO (*Alternate*)

SHRI E. L. BARUI

National Test House, Calcutta

SHRI S. CHANDRA

Indian Register of Shipping, Bombay

SHRI D. G. DODHIA

Shah Malleable Castings Ltd, Thane

SHRI K. S. GARG

Electrosteel Castings Ltd, Calcutta

SHRI S. N. AGRAWAL (*Alternate*)

SHRI GOVIND SINGH

Greysham & Co, Delhi

SHRI F. S. KATPITIA

Jyoti Ltd, Vadodara

SHRI M. R. SHAH (*Alternate*)

SHRI K. S. LAL

Indian Iron & Steel Co Ltd, Calcutta

SHRI M. K. GHOSH (*Alternate*)

SHRI R. N. MUKHERJEE

Steel Authority of India Ltd, Bokaro Steel Plant,
BokaroSHRI A. K. AWASTHI (*Alternate*)

CDR K. R. NAIR

Pioneer Equipment Co Pvt Ltd, Vadodara

SHRI G. N. PANDEY

Oil & Natural Gas Commission, Dehra Dun

SHRI R. A. PANDURANGA

Best & Crompton Engineering Ltd, Madras

SHRI M. BAPUJEE (*Alternate*)

DR P. S. PATTIHAL

Tata Engineering & Locomotive Co Ltd, Jam-
shedpurSHRI B. K. GIRI (*Alternate*)

REPRESENTATIVE

Steel Authority of India Ltd, R & D, Centre for
Iron & Steel, Ranchi(*Continued on page 2*)

© Copyright 1980

INDIAN STANDARDS INSTITUTION

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(Continued from page 1)

<i>Members</i>	<i>Representing</i>
SHRI B. G. SASTRY	Ductron Castings Ltd, Hyderabad
SHRI M. S. DALVI (<i>Alternate</i>)	
SENIOR CHEMIST & METALLURGIST, CHITTARANJAN LOCOMOTIVE WORKS, CHITTARANJAN	Ministry of Railways
DEPUTY DIRECTOR (MET)-I, RESEARCH DESIGN, & STANDARDS ORGANIZATION, LUCKNOW (<i>Alternate</i>)	
SHRI C. S. S. SETTY	Ennore Foundries Ltd, Madras
SHRI T. S. VENKOBA RAO (<i>Alternate</i>)	
SHRI J. N. SHARMA	Heavy Engineering Corporation Ltd, Ranchi
SHRI T. N. TANDON (<i>Alternate</i>)	
SHRI P. J. SHENOY	Kesoram Spun Pipes & Foundries, Calcutta
SHRI S. C. NARSARIA (<i>Alternate</i>)	
SHRI M. P. SINGH	Ministry of Defence (DGOF)
SHRI R. K. SINHA	Fertilizer Corporation of India Ltd, Sindri
SHRI D. SRINIVASAN	Joint Plant Committee, Calcutta
SHRI B. P. GHOSH (<i>Alternate</i>)	
SHRI A. SRINIVASULU	Bharat Heavy Electricals Ltd
SHRI A. K. MITTAL (<i>Alternate I</i>)	
SHRI A. SOMASUNDARAM (<i>Alternate II</i>)	
SHRI N. S. SWAMINATHAN	Tractors and Farm Equipment Ltd, Madras
SHRI S. NATESAN (<i>Alternate</i>)	
SHRI K. M. TANEJA	Directorate General of Supplies & Disposals (Inspection Wing)
SHRI M. C. AICH (<i>Alternate</i>)	
DR J. K. TIWARY	National Metallurgical Laboratory (CSIR), Jamshedpur
SHRI C. R. RAMA RAO, Director (Struc & Met)	Director General, ISI (<i>Ex-officio Member</i>)

Secretary

SHRI SHANTI SWARUP
Deputy Director (Metals), ISI

Panel for Ingot Moulds, SMDC 9/P-2

<i>Convener</i>	
SHRI R. N. MUKHERJEE	Bokaro Steel Plant (SAIL), Bokaro
<i>Members</i>	
SHRI S. C. CHAUDHURY	Steel Furnace Association of India, New Delhi
SHRI D. SRINIVASAN (<i>Alternate</i>)	
SHRI J. V. GADGIL	Indian Iron & Steel Co Ltd, Kulti
SHRI M. K. GHOSH (<i>Alternate</i>)	
SHRI M. N. KHANNA	Bhilai Steel Plant (SAIL), Bhilai
SHRI R. R. SARAN (<i>Alternate</i>)	
SHRI K. N. MEHRA	Heavy Engineering Corporation Ltd, Ranchi
SHRI M. M. C. AGRAWAL (<i>Alternate</i>)	
SHRI P. P. RASTOGI	Rourkela Steel Plant (SAIL), Rourkela
SHRI D. D. SINGH (<i>Alternate</i>)	
REPRESENTATIVE	Ministry of Defence (DGOF)
SHRI I. D. SHERWANI	Modella Steels & Alloys Ltd, Bombay
SHRI T. SUDHAKAR	Tata Iron & Steel Co Ltd, Jamshedpur
SHRI A. N. MITRA (<i>Alternate</i>)	

AMENDMENT NO. 1 MARCH 2011
TO
IS 3005 (PART 1) : 1979 SPECIFICATION FOR GREY CAST IRON INGOT
MOULDS, STOOLS AND SLAG LADLES

PART 1 BOTTOM STOOLS FOR LARGE SIZE INGOT MOULDS WEIGHING 8 TONNES AND HIGHER

(First Revision)

(Page 4, clause 3.1) — Substitute 'IS 228†' for 'IS : 228 - 1959†'.

(Page 4, clause 3.1, informal table, row 1) — Substitute the following for the existing:

<i>Constituent</i>	<i>Percent</i>
Carbon	3.4 to 3.6'

(Page 4, informal table, row 4, col 2) — Substitute '0.18' for '0.3'.

(Page 4, footnote marked †) — Substitute the following for the existing:

'Methods of chemical analysis of pig iron, cast iron and plain carbon and low alloy steels (*revised*) (issued in parts).'

(Page 6, clause 7.1, line 2) — Substitute '36 hours' for '48 hours'.

(Page 6, clause 8.1) — Add the following sentence at the end:

'No welding is permitted.'

(Page 6, clauses 8.2 to 8.5) — Delete.

*(Page 6, footnote marked *)* — Delete.

(Page 7, clause 13.2.1) — Substitute the following for the existing:

'**13.2.1 BIS Certification Marking**

Each stool may also be marked with the Standard Mark.

Amend No. 1 to IS 3005 (Part 1) : 1979

13.2.1.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.'

(MTD 6)

Indian Standard

SPECIFICATION FOR GREY CAST IRON INGOT MOULDS, STOOLS AND SLAG LADLES

PART I BOTTOM STOOLS FOR LARGE SIZE INGOT MOULDS WEIGHING 8 TONNES AND HIGHER

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part I) (First Revision) was adopted by the Indian Standards Institution on 16 November 1979, after the draft finalized by the Cast Iron and Malleable Cast Iron Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard was first published in 1964. While reviewing the standard in the light of the experience gained, the Committee felt that this standard should be issued in parts covering the requirements for bottom stools and ingot moulds of various sizes. This standard is one of the series of the various parts and shall be covering bottom stools for large size ingot moulds weighing 8 tonne and higher.

0.2.1 The other parts are as follows:

Part II Grey cast iron ingot moulds of mass more than eight tonnes

Part III grey cast iron ingot moulds of mass more than one tonne and up to eight tonnes

Part IV grey cast iron ingot moulds of mass up to one tonne
(a) Without hot tops, and (b) With hot tops

0.2.2 In this revision chemical composition has been modified and the various other requirements like pouring temperature, cooling cycle, hardness and heat treatment have also been specified to guide manufacturers in the production of bottom stools.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance

IS : 3005 (Part I) - 1979

with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part I) covers the requirements for bottom stools for large size ingot moulds. Dimensions of bottom stools shall be in accordance with dimensions of ingot moulds.

2. MANUFACTURE

2.1 Melting procedure shall be optional to the manufacturer.

3. CHEMICAL COMPOSITION

3.1 The material when analyzed in accordance with IS : 228-1959†, shall have the following chemical composition:

<i>Constituent</i>	<i>Percent</i>
Carbon equivalent { TC + 0.3 (Si + P) }	4.2 to 4.4
Silicon	1.2 to 1.8
Manganese	0.6 to 0.9
Phosphorus	0.3, <i>Max</i>
Sulphur	0.08, <i>Max</i>

4. SAMPLING FOR CHEMICAL ANALYSIS

4.1 Two spoon samples shall be taken during the pouring of each cast or ladle when about one-third and two-thirds of the metal has been discharged. The spoon samples so obtained shall be cast separately in dry sand in the form of 30 mm diameter bars about 75 mm long. Alternatively, the mould may be filled directly from the metal stream. The test bars shall be suitably marked so that the castings they represent could be identified.

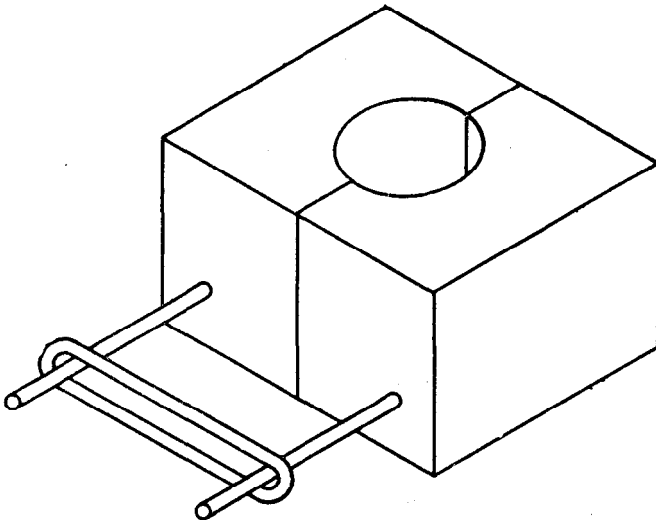
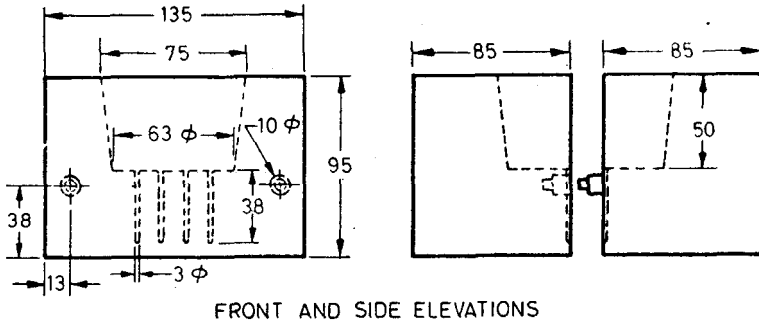
4.2 After cleaning the surface, two flats shall be ground near the bottom of each test bar and the test bar drilled with a 25-mm drill from one

*Rules for rounding off numerical values (*revised*).

†Methods of chemical analysis of pig iron, cast iron, plain carbon and low-alloy steels (*revised*).

clean surface to the other. The speed of the drill should not be more than 9 to 10 rev/min. Drillings after being thoroughly mixed shall constitute the sample for chemical analysis.

4.3 For the determination of total carbon the liquid metal shall be poured into a special spilt mound (see Fig. 1). This gives pins of iron 3 mm in diameter which can be broken off and used directly for total carbon determination.



All dimensions in millimetres.

FIG. 1 PIN MOULD FOR CARBON SAMPLES

5. POURING METHOD

5.1 The bottom stools shall be cast in box or open. Pouring shall be done through pouring cup from the ladle having stopper arrangement or lip pouring.

5.2 Fifteen to twenty minutes after pouring hot metal, surface of the bottom plate shall be covered with dry sand in case of open castings. Thickness of sand shall be 25-30 mm.

6. POURING TEMPERATURE

6.1 Pouring temperature shall be 1190 to 1220°C when measured by optical pyrometer.

7. COOLING CYCLES

7.1 The bottom plate shall be cooled in the mould for a minimum period of 48 hours.

8. FETTLING AND RECTIFICATION

8.1 The surface of bottom plate shall be smooth and even and shall be free from fused sand.

8.2 The plates may be welded if agreed to between the purchaser and the manufacturer.

8.3 In case of welding surface shall be cleaned by chiselling and grinding.

8.4 In case of welding, all repairs by welding shall be carried out in accordance with the procedure laid down in IS : 5139-1969*.

8.5 In case the plates are welded and if so required by the purchaser the castings may be examined by magnetic particles or any other appropriate method of non-destructive testing in order to determine the freedom from any crack or porosity.

9. HEAT TREATMENT

9.1 If required, the bottom plates may be stress relieved by heating to a temperature of 700 to 750°C and soaking for 10-30 h depending upon the thickness of the bottom plate and by cooling slowly at the rate of 40°C/h in furnace till the temperature of 250°C is attained.

10. HARDNESS

10.1 If specified by the purchaser, the hardness of the bottom plates shall not exceed 140 HB, when tested by Poldy hardness tester.

*Recommended procedure for repair of grey iron castings by oxy-acetylene and manual metal arc welding.

11. DIMENSIONAL TOLERANCES

11.1 Dimensional tolerances shall be as follows:

- a) The evenness of the working surface of the bottom stool is more important in the region where the ingot moulds are to be placed. In order to ascertain this the working surface should be checked with a template extending 50 mm on either side of the edge of the bottom contour of the mould. Maximum permissible gap between the surface of the template and surface of the bottom stool may be permitted 3 mm at the inside edge and 5 mm on the outside edge. In the portions not covered by the template minor surface unevenness may be allowed.
- b) Thickness $\pm$ 25 mm.
- c) Length and breadth $\pm$ 25 mm.

12. RE-TEST AND REJECTION

12.1 If a sample selected for testing fails to meet the requirements specified under **3.1** and **10.1**, the purchaser shall select two further samples from the same cast or ladle. If on testing, either of these samples fails to meet the specified requirements, the whole lot shall be deemed as not complying with this standard.

13. MARKING

13.1 Each stool shall be legibly marked with an identification mark at proper location by which it is possible to trace the cast or ladle from which it was poured.

13.2 By agreement between the purchaser and the manufacturer, stool complying with the requirements of this standard shall, after inspection, be legibly marked with an acceptance mark.

13.2.1 The stool may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

INDIAN STANDARDS

ON

CAST IRON AND MALLEABLE CAST IRON

IS:

- 210-1978 Grey iron castings (*third revision*)
- 1230-1978 Cast iron rainwater pipes and fittings (*second revision*)
- 1536-1976 Centrifugally cast (spun) iron pressure pipes for water, gas and sewage (*second revision*)
- 1537-1976 Vertically cast iron pressure pipe for water, gas and sewage (*first revision*)
- 1538 (Parts I to XXIII)-1976 Cast iron fittings for pressure pipes for water, gas and sewage (*second revision*)
- 1729-1964 Sand cast iron spigot and socket soil, waste and ventilating pipes fittings and accessories
- 1865-1974 Iron castings with spheroidal or nodular graphite (*second revision*)
- 1879 (Parts I to X)-1975 Malleable cast iron pipe fittings (*first revision*)
- 2107-1977 Whiteheart malleable iron castings (*first revision*)
- 2108-1977 Blackheart malleable iron castings (*first revision*)
- 2640-1977 Pearlitic malleable iron castings (*first revision*)
- 2749-1974 Austenitic iron castings (*first revision*)
- 3355-1974 Grey iron castings for elevated temperatures for non-pressure containing parts (*first revision*)
- 3486-1966 Cast iron spigot and socket drain pipes
- 3516-1968 Cast iron pipe flanges and flanged fittings for petroleum industry
- 3896-1966 Comparison of Indian and Overseas standards for iron castings
- 3989-1970 Centrifugally cast (spun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories (*first revision*)
- 4771-1972 Abrasion-resistant iron castings (*first revision*)
- 5519-1979 Deviations for untoleranced dimensions of grey iron castings (*first revision*)
- 5531 (Parts I to III)-1977 Cast iron specials for use with asbestos cement pressure pipes (*first revision*)
- 5787-1970 Spheroidal or nodular graphite iron castings for paper mill dryer rolls
- 5788-1970 Iron castings with spheroidal or nodular graphite for pressure containing parts for use at elevated temperatures
- 5789-1970 Austenitic spheroidal iron castings for pressure containing parts suitable for low temperature service
- 6163-1978 Centrifugally cast (spun) iron low pressure pipes for water, gas and sewage (*first revision*)
- 6331-1971 Automotive grey iron castings
- 6418-1971 Cast iron and malleable cast iron flanges for general engineering purposes
- 6629-1972 Cast iron rolls
- 7181-1974 Horizontally cast iron double flanged pipes for water, gas and sewage
- 7520-1974 Corrosion-resistant high silicon iron castings
- 7925-1976 Low alloy types of abrasion resistant iron castings
- 8329-1977 Centrifugally cast (spun) ductile iron pressure pipes for water, gas and sewage
- 8349-1977 Deviations for untoleranced dimensions of malleable iron castings
- 8350-1977 Deviations for untoleranced dimensions of spheroidal or nodular graphite iron castings
- 8794-1978 Cast iron detachable joints for use with asbestos cement pressure pipes

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg. m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

INDIAN STANDARDS INSTITUTION

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 26 60 21, 27 01 31

Telegrams : Manaksanstha

Regional Offices:

		Telephone
Western : Novelty Chambers, Grant Road	BOMBAY 400007	37 97 29
Eastern : 5 Chowringhee Approach	CALCUTTA 700072	23-08 02
Southern : C. I. T. Campus, Adyar	MADRAS 600020	41 24 42

Branch Offices:

'Pushpak', Nurmohamed Shaikh Marg, Khanpur	AHMADABAD 380001	2 03 91
'F' Block, Unity Bldg, Narasimharaja Square	BANGALORE 560002	2 76 49
Gangotri Complex, Bhadrhada Road, T. T. Nagar	BHOPAL 462003	6 27 16
22E Kalpana Area	BHUBANESHWAR 751014	5 36 27
Ahimsa Bldg, SCO 82-83, Sector 17C	CHANDIGARH 160017	2 83 20
5-8-56C L. N. Gupta Marg	HYDERABAD 500001	22 10 83
D-277 Todermal Marg, Banipark	JAIPUR 302006	6 98 32
117/418 B Sarvodaya Nagar	KANPUR 208005	8 12 72
Pattiputra Industrial Estate	PATNA 800013	6 28 08
Hantex Bldg (2nd Floor), Rly Station Road	TRIVANDRUM 695001	32 27